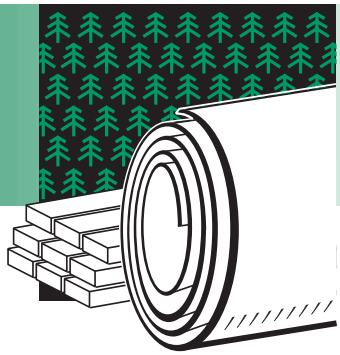
FOREST PRODUCTS

Project Fact Sheet



Acoustic Separation Technology

Benefits

- Eliminates problems such as clogging, fiber damage, and pulsation
- Offers technique for potential separation of vessels or shives from fibers, and of various fiber species (e.g., softwood from hardwood)
- Saves energy and water
- Increases use of raw materials
- Improves product quality
- Offers excellent controllability compared to pressure-screen systems

Applications

The process will replace inefficient pressure-screen systems with a potential for superior separations. Additional applications are related to deinking and pulp-thickening operations, and improved particle removal in closed water systems.

After successful technical and economical evaluation of the pilot-scale system, the industrial partner would proceed to commercialization of the acoustic technology.

Papermakers will use acoustic technology to separate fibers and improve productivity

More efficient separation technologies can be applied to numerous processes during papermaking. Separating vessel elements from fibers, shives from fines, hardwood from softwood, contaminants from fines, and water from waste products are a few of the areas where better methods could improve paper production.

The Institute of Paper Science and Technology (IPST) has been studying the effects of acoustic radiation on fiber suspensions for more than five years, and has found that fibers suspended in water migrate and reorient themselves when they interact with acoustic radiation pressure. This principle can be exploited to separate fibers based on fiber width, and will be the basis of this project.

Because the technology has no screens or moving parts, problems such as clogging and fiber damage are not expected. The fact the technology is electric-driven gives it good controllability and versatility with regard to input streams. Its efficiency in separating fiber species will conserve energy, water, and raw materials, and improve the mill's productivity.

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Project Description

Goal: Exploit the use of acoustic radiation to separate fibers based on fiber width when suspended in water as a technology for on-line use during paper processing.

This three-phase, four-year project will begin with a laboratory demonstration of a new 80-GPM acoustic separator, and a preliminary economical assessment of the proposed separation method. Phase II will be devoted to developing a pilot-scale, 500-GPM, pressurized acoustic separator, and to carrying out computational analysis of fiber suspensions subjected to an ultrasonic wave field under various flow conditions. A large part of this effort will be the design of energy-efficient, large-scale transducers that can withstand harsh operating conditions. In the final phase of the project, the technical and economical aspects of the pilot-scale system will be considered during tests in an industrial facility.

Progress & Milestones

- A fundamental study was undertaken of fiber motion in the presence of a traveling wave in a water tank, using microspheres and rayon fibers of known dimensions.
- Using the water tank, a thorough investigation was initiated of acoustic radiation force vs. streaming and cavitation.
- The development of a method for total acoustic power measurements was initiated.
- Additional whitewater clarification experiments were performed using chemical flocculation and ultrasonics, and were well-received by industry.
- A demonstration and technical evaluation of the pilot system in an industrial facility is likely to be conducted sooner than expected.
- Negotiations were completed for a partnership between the Institute of Paper Science and Technology and an industrial partner, the Beloit Corporation.

Project Partners

Institute of Paper Science
and Technology
Atlanta, GA

Naval Undersea Warfare Center
Orlando, FL

Sonic Concepts
Woodinville, WA

Georgia Institute of Technology
Atlanta, GA

Beloit Corporation
Beloit, WI

For additional information, please contact:

Elliott Levine
Office of Industrial Technologies
Phone: (202) 586-1476
Fax: (202) 586-3237
elliott.levine@ee.doe.gov

Pierre Brodeur
Institute of Paper Science & Technology
Phone: (404) 894-7702
Fax: (404) 894-4778
pierre.brodeur@ipst.edu

Please send any comments,
questions, or suggestions to
webmaster.oit@ee.doe.gov

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Office of Industrial Technologies
Energy Efficiency and
Renewable Energy
U.S. Department of Energy
Washington, D.C. 20585

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